

Alpha-gal syndrome in Ohio

The Ohio River Valley is currently experiencing the most significant expansion of tick populations in the United States, with a corresponding rise in alpha-gal syndrome cases that poses increasing risk to Ohioans.^{16,42-44}

Background

Alpha-gal syndrome (AGS) is an emerging tick-borne disease that causes an IgE-mediated allergy to the sugar galactose- α -1,3-galactose (alpha-gal), which is found in all mammals except some primates.¹ In the U.S., most cases are caused by lone star tick bites.^{2,3}

People with AGS react to products made from mammals. This includes foods such as beef, pork, lamb, venison, dairy products, and gelatin.³⁻⁵ It also includes drugs and medical products, such as monoclonal antibodies, heparin, bioprosthetic heart valves, some vaccines, antivenom, medication in gelatin capsules, and many other medical products.³⁻⁵ Over 75% of people with AGS report reacting to a medication, and about 50% report that they have experienced an anaphylactic reaction to a health product.⁶ Many people with AGS also react to personal care and household products with mammal-derived ingredients, and farmers and ranchers can have life-threatening reactions to livestock exposures.^{3,46}

Alpha-gal reactions are often severe and can be fatal.^{3,4,7} 60-75% of people with AGS experience anaphylactic reactions—a higher rate than is seen even with peanut allergy.^{8,9,45} In areas of high prevalence, reactions to alpha-gal can be the number one cause of anaphylaxis in adults and adolescents, accounting for a third of all cases, more than all other food allergies combined.¹⁰ Studies suggest that in high-prevalence areas, AGS may also be responsible for up to 25% of IBS-like symptoms and a significant cause of rheumatological issues.^{11,12} Concerningly, preliminary research in both the U.S. and Australia found that people who are sensitized to alpha-gal, even if they do not develop allergic reactions, may be at increased risk of cardiovascular disease.^{13,14} The NIH is currently funding a follow-up study of this issue.²⁸

Due to growing lone star tick populations, the number of AGS cases is increasing at an alarming rate.^{15,16} In a July 2023 report, the CDC recognized AGS as a growing clinical and public health concern.¹⁶ They reported that between 2010 and 2022, more than 110,000 suspected cases of AGS were identified and estimated that up to 450,000 Americans may be affected, making AGS the 10th most common food allergy.^{16,17} Yet alarmingly, 78% of physicians know little to nothing about AGS, and only 5% feel very confident in diagnosing and managing it.¹⁸

Ohio: a growing threat

Alpha-gal syndrome cases are not distributed evenly across the U.S. They are concentrated in areas where lone star ticks are found.¹⁶ The Ohio River Valley is currently experiencing the most significant expansion of tick populations in the United States, and lone star ticks are now found throughout Ohio.⁴³ Currently, southern Ohio is most impacted—especially along the Ohio River—but lone star ticks are rapidly expanding into northern Ohio as well.⁴²⁻⁴⁴

Due to a lack of physician awareness, alpha-gal syndrome is massively underdiagnosed.¹⁸ And due to a lack of reporting requirements, we don't know how many Ohioans have been diagnosed with AGS.

However, based on data from a study of military recruits, we can estimate that 4% Ohioans have the allergic antibody to alpha-gal, and more than 20,000 likely have full-blown alpha-gal syndrome.¹⁹



Source: Geographic distribution of suspected alpha-gal syndrome cases - United States, January 2017-December 2022.

Estimated Distribution of Lone Star Ticks
(*Amblyomma americanum*) in Ohio, 2010-2025



- No record (no ticks identified to date) – 23 counties
- Reported (one to five ticks identified within the same year) – 39 counties
- Established (more than five ticks or more than two stages identified within the same year) – 26 counties

Based on identification records from both passive and active surveillance conducted by the Ohio Department of Health, the Ohio State University, local health agencies, private laboratories, published research, and other sources.
Last updated: 11/7/2025



A call to action

In a July 2023 report, the CDC recognized AGS as a growing clinical and public health concern.¹⁶ Due to the current lack of surveillance, they stated, the true prevalence of AGS is largely unknown.¹⁶ The CDC identified a “critical need” for state and local health authorities to initiate surveillance and encourages them to do so.^{16,32} The CDC recently laid the groundwork for states to make AGS reporting mandatory, publishing a National Notifiable Diseases Surveillance System case definition for alpha-gal syndrome (AGS)³³ and creating an Alpha-gal Syndrome Case Report Form.³⁴ In September 2023, Arkansas became the first state to make AGS a mandatory, reportable health condition.³⁵ Since then, ten other states have followed suit: Delaware, Iowa, Kentucky, Nebraska, North Dakota, Oregon, South Carolina, Tennessee, Virginia, and West Virginia.

Given the unknown and likely significant impact of AGS on Ohioans with AGS, their families, and state healthcare systems, the rapid implementation of improved AGS surveillance should be a top priority for the state.

References:

1. Commins SP, Satinover SM, Hosen J, et al. Delayed anaphylaxis, angioedema, or urticaria after consumption of red meat in patients with IgE antibodies specific for galactose-alpha-1,3-galactose. *J Allergy Clin Immunol*. 2009;123(2):426-433.
2. Commins SP, James HR, Kelly LA, et al. The relevance of tick bites to the production of IgE antibodies to the mammalian oligosaccharide galactose- α -1,3- galactose. *J Allergy Clin Immunol*. 2011;127(5):1286-1293.e6.
3. Commins SP. Diagnosis & management of alpha-gal syndrome: lessons from 2,500 patients. *Expert Rev Clin Immunol*. 2020;16(7):667-677.
4. Platts-Mills TAE, Li RC, Keshavarz B, Smith AR, Wilson JM. Diagnosis and Management of Patients with the α -Gal Syndrome. *J Allergy Clin Immunol Pract*. 2020;8(1):15-23.e1.
5. Center for Disease Control and Prevention: Alpha-gal Syndrome; retrieved June 5, 2023. <https://www.cdc.gov/ticks/alpha-gal/index.html>
6. Alpha-gal in health products triggers anaphylaxis in half of alpha-gal syndrome patients. Richard Gawel. *Healio*. Published online June 27, 2023.
7. Steinke JW, Platts-Mills TAE, Commins SP. The alpha-gal story: lessons learned from connecting the dots. *J Allergy Clin Immunol*. 2015;135(3):589-596; quiz 597.
8. Wilson JM, Schuyler AJ, Workman L, et al. Investigation into the α -Gal Syndrome: Characteristics of 261 Children and Adults Reporting Red Meat Allergy. *J Allergy Clin Immunol Pract*. 2019;7(7):2348-2358.e4.
9. Fischer J, Yazdi AS, Biedermann T. Clinical spectrum of α -Gal syndrome: from immediate-type to delayed immediate-type reactions to mammalian innards and meat. *Allergo J*. 2016;25:55-62.
10. Pattanaik D, Lieberman P, Lieberman J, Pongdee T, Keene AT. The changing face of anaphylaxis in adults and adolescents. *Ann Allergy Asthma Immunol*. 2018;121(5):594-597.
11. Richards NE, Richards RD Jr. Alpha-Gal Allergy as a Cause of Intestinal Symptoms in a Gastroenterology Community Practice. *South Med J*. 2021;114(3):169-173.
12. Kimpel D, Wilson J, Lewis J. SAT0456 SERO-REACTIVITY TO GALACTOSE- ALPHA-1,3-GALACTOSE AND CLINICAL PRESENTATIONS OF PATIENTS SEEN IN A RHEUMATOLOGY OUTPATIENT PRACTICE. *Ann Rheum Dis*. 2019;78(Suppl 2):1317-1318.
13. Wilson JM, Nguyen AT, Schuyler AJ, Commins SP, Taylor AM, Platts-Mills TA, et al. IgE to the mammalian oligosaccharide galactose- α -1, 3-galactose is associated with increased atheroma volume and plaques with unstable characteristics—Brief Report. *Arteriosclerosis, thrombosis, and vascular biology*. 2018;38(7):1665-9.
14. Vernon ST, Kott KA, Hansen T, et al. Immunoglobulin E sensitization to mammalian oligosaccharide galactose- α -1,3 (α -Gal) is associated with noncalcified plaque, obstructive coronary artery disease, and ST-segment- elevated myocardial infarction. *Arterioscler Thromb Vasc Biol*. Published online January 20, 2022;ATVBAHA121316878.
15. Monzón JD, Atkinson EG, Henn BM, Benach JL. Population and Evolutionary Genomics of Amblyomma americanum, an Expanding Arthropod Disease Vector. *Genome Biol Evol*. 2016;8(5):1351-1360.
16. Thompson JM, Carpenter A, Kersh GJ, Wachs T, Commins SP, Salzer JS. Geographic distribution of suspected alpha-gal syndrome cases - United States, January 2017-December 2022. *MMWR Morb Mortal Wkly Rep*. 2023;72(30):815- 820.
17. Mysterious meat allergy passed by ticks may affect hundreds of thousands in US, CDC estimates. CNN. Updated 2:05 PM EDT, Sat July 29, 2023
18. Carpenter A, Drexler NA, McCormick DW, et al. Health care provider knowledge regarding alpha-gal syndrome - United States, march-may 2022. *MMWR Morb Mortal Wkly Rep*. 2023;72(30):809-814.
19. Ailsworth SM, Susi A, Workman LJ, et al. Alpha-gal IgE Prevalence Patterns in the United States: An Investigation of 3000 Military Recruits. *J Allergy Clin Immunol Pract*. Published online October 31, 2023. doi:10.1016/j.jaip.2023.10.046
20. Gaines DN, Operario DJ, Stroup S, et al. Ehrlichia and spotted fever group Rickettsiae surveillance in Amblyomma americanum in Virginia through use of a novel six-plex real-time PCR assay. *Vector Borne Zoonotic Dis*. 2014;14(5):307- 316.

21. Nadolny RM, Wright CL, Sonenshine DE, Hynes WL, Gaff HD. Ticks and spotted fever group rickettsiae of southeastern Virginia. *Ticks Tick Borne Dis.* 2014;5(1). doi:10.1016/j.ttbdis.2013.09.001
22. Ehrlichiosis Factsheet. Virginia Department of Health. Accessed Jan 7, 2023. <https://www.vdh.virginia.gov/epidemiology/epidemiology-fact-sheets/ehrlichiosis/>
23. Wilson JM, Keshavarz B, James HR, Retterer MK, Schuyler AJ, Knoedler A, et al. α -Gal specific-IgE prevalence and levels in Ecuador and Kenya: Relation to diet, parasites, and IgG4. *Journal of Allergy and Clinical Immunology.* 2021;147(4):1393-401. E7.
24. Commins S, Kelly L, Ronmark E, HR J, Pochan S, Peters E, et al. Galactose- α -1,3-galactospecific IgE is associated with anaphylaxis but not asthma. *Am J Respir Crit Care Med.* 2012;185(7):723-30.
25. Fischer J, Lupberger E, Hebsaker J, et al. Prevalence of type I sensitization to alpha-gal in forest service employees and hunters. *Allergy.* 2017;72(10):1540- 1547.
26. Richards N, Keshavarz B, Workman L, Patel J, Platts-Mills T, Wilson J. Prevalence of α -Gal IgE and Mammalian Meat Allergy in a COVID-19 Vaccine Employee Cohort. *J Allergy Clin Immunol.* 2022;149(2):AB207.
27. Bianchi J, Walters A, Fitch ZW, Turek JW. Alpha-gal syndrome: Implications for cardiovascular disease. *Global Cardiology Science and Practice.* 2020;2019(3).
28. Loren Erickson, PhD and Coleen McNamara, MD, Awarded \$4 Million NIH R01 Grant to Study IgE Sensitivity to Alpha-gal and Cardiovascular Disease. Medicine in Motion News. Published September 1, 2022. Accessed October 24, 2024.
<https://news.med.virginia.edu/research/loren-erickson-phd-and-coleen-mcnamara-md-awarded-4m-nih-r01-grant-to-study-ige-sensitivity-to-alpha-gal-and-cardiovascular-disease/>
29. Centers for Disease Control. Lone Star Tick Surveillance Amblyomma americanum – Estimated and Established Distribution. Published online July 26, 2022. Accessed August 29, 2024.
30. Goddard J. A ten-year study of tick biting in Mississippi: implications for human disease transmission. *J Agromedicine.* 2002;8(2):25-32.
31. White-Tailed Deer. Accessed December 21, 2024.
<https://extension.msstate.edu/natural-resources/wildlife/white-tailed-deer>
32. Emerging Tick Bite-Associated Meat Allergy Potentially Affects Thousands: Many healthcare providers not familiar with allergic condition. CDC press release. July 27, 2023. Accessed online Jan 7, 2023.
<https://www.cdc.gov/media/releases/2023/p0727-emerging-tick-bites.html>
33. CDC National Notifiable Diseases Surveillance System (NNDSS) Alpha-gal syndrome 2022 case definition.
<https://nndss.cdc.gov/casedefinitions/alpha-gal-syndrome-agss/>
34. CDC alpha-gal syndrome case report form.
https://www.cdc.gov/ticks/alphagal/pdfs/328065-A_NCEZID_FRM_Alpha_gal_CRF_508_2.pdf
35. Arkansas Department of Health (ADH) Mandatory Reportable Diseases List and Instructions. Accessed online Jan 7, 2023. https://www.healthy.arkansas.gov/images/uploads/pdf/List_and_Instructions_Reportable_Diseases.pdf
36. Sonenshine DE. Range expansion of tick disease vectors in north America: Implications for spread of tick-borne disease. *Int J Environ Res Public Health.* 2018;15(3):478.
37. Rochlin I, Egizi A, Lindström A. The original scientific description of the Lone Star tick (Amblyomma americanum, Acari: Ixodidae) and implications for the species' past and future geographic distributions. *J Med Entomol.* 2022;59:412-420.
38. Stafford KC 3rd, Molaei G, Little EAH, Paddock CD, Karpathy SE, Labonte AM. Distribution and establishment of the Lone Star tick in Connecticut and implications for range expansion and public health. *J Med Entomol.* 2018;55(6):1561-1568.
39. McClung KL, Little SE. Amblyomma americanum (Lone star tick). *Trends Parasitol.* 2023;39(1):70-71.
40. Saunders EF, Sohail H, Myles DJ, et al. Alpha-gal syndrome after *Ixodes scapularis* Tick Bite and statewide surveillance, Maine, USA, 2014-2023. *Emerg Infect Dis.* 2025;31(4):809-813.
41. Disease I. 20 Health Advisory 13: Tick-borne Diseases in New York City.
<https://www.nyc.gov/assets/doh/downloads/pdf/han/advisory/2025/han-advisory-13-tick-borne-disease.pdf>
42. Estimated Distribution of Lone Star Ticks in Ohio Map. Accessed January 31, 2026.
<https://odh.ohio.gov/know-our-programs/zoonotic-disease-program/media/lone-star-tick-distribution-map>
43. Bruton D. Expert health panel focuses on rising risks from tick bites. Brown County Democrat. February 26, 2025. Accessed January 31, 2026.

<https://bcdemocrat.com/2025/02/26/expert-health-panel-focuses-on-rising-risks-from-tick-bites/>

44. Vetter E. This tick's bite can cause an allergy to red meat, and it's found in Ohio. Here's what to know. *The Cincinnati Enquirer*.

<https://www.cincinnati.com/story/news/2022/05/06/lone-star-tick-red-meat-allergy-ohio/9661091002/>. May 6, 2022.

Accessed January 31, 2026.

45. Human Foods Program. Guidance for FDA Staff and Interested Parties: Evaluating the Public Health Importance of Food Allergens Other Than the Major Food Allergens Listed in the Federal Food, Drug, and Cosmetic Act. U.S. Food and Drug Administration. January 6, 2025. Accessed December 23, 2025.

<https://www.fda.gov/regulatory-information/search-fda-guidance-documents/guidance-fda-staff-and-interested-parties-evaluating-public-health-importance-food-allergens-other>

46. Nuñez-Orjales R, Martin-Lazaro J, Lopez-Freire S, Galan-Nieto A, Lombardero-Vega M, Carballada-Gonzalez F. Bovine amniotic fluid: A new and occupational source of galactose- α -1,3-galactose. *J Investig Allergol Clin Immunol*. 2017;27(5):313-314. doi:10.18176/jiaci.0170